

The Chehalis Fisheries Restoration Program (CFRP)

Evaluation Strategy for Fisheries Conservation, Habitat Restoration, and Habitat Enhancement Projects in the Chehalis River Basin.

October 1994

The Chehalis Fisheries Restoration Program's (CFRP) current emphasis on restoring degraded stream habitat and creating new habitat through opening access to spawning grounds, re-opening side channels, creating spawning channels, etc., will continue through 2010. Increased public interest and funding have made the CFRP a major part of fisheries restoration efforts in the Pacific Northwest. Due to the long-term nature of CFRP, habitat restoration success must be scientifically monitored, evaluated, and documented beginning in the early stages.

The overall strategy is to organize evaluations into groups that are better evaluated extensively (i.e., over a large geographic area), intensively (at a local site), or by a combination of these approaches. The following discussion describes how success will be evaluated by one or both approaches depending on the type of restoration project.

BASIN-WIDE EVALUATION

It is important to understand whether restoration projects are producing more fish in the Chehalis Basin as a whole. Factors that support basin-wide evaluation include:

1. the Basin's enormous size and multiple sub-basins,
2. many variations among sub-basins,
3. the widespread interest in determining whether CFRP is working, and
4. the multitude of restoration projects occurring throughout the Basin by various enhancement entities.

Proposed strategies include the following:

• Estimate Chehalis Basin coho smolt production. Coordinate with Washington Department of Fish and Wildlife's (WDFW) ongoing Freshwater Production Evaluation Program, which estimates total smolt production from the Chehalis Basin and estimates contribution to ocean, harbor, and in-river harvests. Smolt production could be evaluated by expanding into sub-basins targeted for extensive restoration work. Steelhead or other salmon production may be estimated during periods of overlapping outmigration. Proposed tasks include:

1. Increase the number of coho trapping tributaries.
2. Expand locations of smolt recovery to improve overall Basin estimate.

• Improve understanding of Chehalis salmon and steelhead life history. Some habitat variability exists among Chehalis River sub-basins. Selected sub-basins should be evaluated to determine seasonal habitat value. There is a tendency in habitat restoration work to "open up" and/or create new habitat without knowing potential benefits. Information on seasonal habitat use by juvenile salmonids in the Chehalis River will help the CFRP Technical Review Team identify the limiting factors in degraded sub-basins before major habitat restoration work occurs. Proposed tasks include:

1. Determine potential application of Point-No-Point Treaty Council's "Evaluation of Natural Stock Improvement Measures for Hood Canal Coho Salmon" (Lestelle 1993).
2. Determine the potential for adopting habitat restoration procedures described in a recent article entitled "An Approach to the Diagnosis and Treatment of Depleted Pacific Salmon Populations in Freshwater Ecosystems" (Lichatowich et al. 1994). This six-step approach recognizes the importance of an ecosystem perspective and compares historic and current habitat complexity and connectivity and intrapopulation life history diversity.
3. Study the migratory behavior of salmon and steelhead to establish baseline of life history where smolts are trapped.

• Improve spawner escapement estimates. Enumerating adult returns to a system is an important management tool used for measuring fish production. In many cases, increased adult returns may indicate the success of habitat restoration projects. Proposed tasks include:

1. Increase the frequency of spawner surveys in index areas.
2. Increase the number of index areas, particularly where habitat improvements are being conducted.
3. Improve spawner escapement estimation techniques.

PROJECT-TYPE EVALUATION

Evaluating types of projects would help CFRP determine cost-effective habitat restoration techniques that increase fish production. Factors that support evaluations by project type include:

1. the many different applications of similar techniques,
2. the many natural variables in watersheds that make direct applications to other potential projects difficult, and
3. the effects of low-impact, conservation-type projects (e.g., fencing, revegetation) can be evaluated over large geographic areas.

Proposed strategies include the following:

• Evaluate unique projects on an individual basis. To validate a particular restoration technique it is essential to evaluate prototype projects intensively.

• Evaluate one of several similar projects. In cases where groups of similar project types occur in the same sub-basin, it may be necessary to evaluate only one of those projects.

Included here are proposed strategies as they relate to project types.

Forest Road Closure, Obliteration, Sediment Source Control

In the Chehalis River Basin, the combination of naturally unstable terrain and intensive land use in the upper reaches of watersheds has created a need for erosion control programs to rehabilitate heavily disturbed slopes. Portions of extensive road networks are abandoned or poorly managed, resulting in debris torrents or chronic sedimentation. Early treatment of these problems can prevent adverse downslope impacts.

• Intensive evaluations at selected sites are necessary. For initial projects of this type, restoration techniques will be monitored closely until proven effective. Proposed tasks include:

1. Establish index study reaches in several test watersheds slated for forest road rehabilitation and in several control watersheds that are similar, but relatively stable.
2. Annually measure such variables as fish use, sediment load, aggradation of streambed, and erosion. The following survey types may be applied: Photo Point, Channel Condition, Streambank Erosion, Streambed Stability, Channel Substrate, Road Surface Condition, Runoff Sampling, Sediment Routing, Amphibian, and Macroinvertebrate (Rashin et al. 1993).
3. Record observations of rehabilitated sites during periods of heavy runoff.
4. Develop a component within the CFRP Watershed Restoration Plan that specifically addresses sediment and erosion problems related to forest roads (Spreiter 1992; Weaver and Hagans 1993).

Off-Channel Spawning Channels, Spawning Habitat Enhancement

There are several documented examples of spawning habitat improvements conducted in the Pacific Northwest and British Columbia. In watersheds experiencing heavy siltation rates, off-channel spawning areas have provided suitable spawning habitat. Many Chehalis Basin tributaries are rich in gravel supply but egg survival is often negated by fines and scour associated with unstable stream channels.

• Intensive evaluation is recommended due to variability among sub-basins. Proposed tasks include:

1. Describe existing spawning habitat quality and quantity to identify any obvious deficits when developing potential projects.

2. Monitor proximate spawning areas to determine an increased number of returning spawners as opposed to merely a shift in spawning habitat use.
3. Survey redds in proposed enhancement areas and install emergent and/or outmigrant fry traps to determine incubation success.

Off-Channel Rearing Habitat

There is a high degree of interest by CFRP cooperators in developing off-channel habitats throughout the Basin. A vast amount of information is available describing the benefits of off-channel rearing habitat for juvenile salmon, especially coho. Natural Resources Consultants (NRC) of Seattle has provided CFRP with information on locations and restoration potential of certain off-channel habitats in the Lower Satsop, Wynoochee, and Chehalis Rivers (Ralph et al. 1994).

Because the upper one-third of the Chehalis Basin's fish habitat may be adversely affected by summer low flows, off-channel habitat enhancement could improve natural hydrological functions as well as fish habitat.

• A combination of intensive and extensive evaluation will be necessary. Off-channel rearing habitats can be diverse in location and function. Proposed tasks include:

1. Conduct a preliminary evaluation of fish use and/or potential. This can be accomplished by utilizing the "Systematic Evaluation of Off-Channel Habitat for Restoration Need and Potential" provided by NRC (Ralph et al. 1994) and "Off-Channel Habitat Enhancement Design Criteria and Post-Project Monitoring Format" (Cowan 1988).
2. Determine seasonal fish use of these habitat types. The practice of opening up or constructing off-channel habitat, despite documented success cases, may not always be the best practice to restore fish populations in a particular stream.
3. Determine the extent of Upper Basin off-channel habitat use in the summer. Marshall Ponds and Merryman's Channel in the South Fork Newaukum River should be evaluated in winter 1994 through summer 1995.
4. Conduct cooperative investigations with the Quinault Indian Nation to determine summer and winter off-channel habitat use of sites identified by NRC (Ralph et al. 1994).

Borrow Pit Reclamation

Abandoned or inactive borrow pits located on floodplains are an attractive, low-cost, potential source of off-channel habitat. They can serve as rearing areas and often offer exceptional spawning potential. Many abandoned or inactive borrow pits exist on the mainstem Chehalis and its major tributaries. These expansive areas develop into complex ecosystems due to the frequent flooding of the Chehalis River. Often, these areas are located near wetlands and information on the effects of altering hydrology is scarce.

• Intensive evaluation of this practice is necessary. Newly abandoned borrow pits are characterized as "sterile" environments. The lack of organic materials, usually provided by shoreline woody debris and vegetation, may not provide favorable water quality or substrate conditions for increased juvenile salmonid production. Conjecturally, cutthroat trout and spiny ray fish use these habitats extensively. There is much variability between site condition and potential function. Proposed tasks include:

1. Develop enhancement plans with extensive woody debris placement and revegetation.
2. Determine species usage before connection to mainstem. Non-native fish may be best left isolated in these ponds. High salmonid predator populations may limit the production potential of this habitat.
3. Determine preferred vertical distribution of juvenile salmonids and their seasonal habitat use within these ponds.
4. Compare percent survival of juvenile salmonids to natural wall-base channel habitats.

Woody Debris Placement, Streambank Stabilization, and Revegetation

Woody debris is an important part of the stream ecosystem. Providing fish habitat and stream stability are two of its many important functions. Some Chehalis River tributaries contain areas void of woody debris. This lack of instream structure often manifests itself in the form of vast areas of erosion, high velocity flows, and simple channel habitat (lacking deep pools).

- Intensive evaluation will be necessary when woody debris placement is intended to perform a specific hydraulic function.
- A combination of intensive and extensive evaluation will be necessary for woody debris loading and logjam dispersal projects. Proposed tasks include:

1. Establish stream channel profiles to determine if the channels are becoming stabilized or performing their desired function as a result of the enhancement work.
2. Establish photo reference points to provide visual evidence of revegetation success.
3. Conduct cooperative water quality evaluations with the Washington State Department of Ecology.
4. Determine fish use of created habitat (e.g., instream and overhead cover) and compare to adjacent areas without such habitat.

Beaver Dams, Barrier Alteration, and Debris Jam Dispersal

Impassable barriers often prohibit anadromous fish migration into miles of suitable habitat. Barrier removal and alteration can be a cost-effective means of gaining valuable habitat. However, beaver dams and impoundments created by debris jams also have valuable habitat and hydrological functions.

• Intensive evaluations are necessary due to the complex nature of blockages. There is the potential for negative impacts in a barrier alteration project. Many considerations must be made in developing these projects. Proposed tasks include:

1. Confirm blockage impassability and longevity.
2. Determine potential habitat gain.
3. Determine the potential negative impacts by describing the function of existing habitat created directly and indirectly by the barrier.
4. Determine effects of change in sediment flow rates and channel morphology.
5. Determine barrier alteration's effect on upstream resident fish and wildlife populations.
6. Establish upstream spawner indexes to indicate post-enhancement utilization.

Livestock Fencing, Revegetation, and Canopy Improvements

Many water quality degradations were identified in the Chehalis River habitat degradation survey (Wampler et al. 1993). CFRP anticipates extensive efforts in streambank and riparian restoration. Exclusion of livestock from the stream channel and revegetating stream banks provide many benefits for fish habitat and water quality.

• Extensive evaluations are necessary in areas of multiple projects. Due to the subtle, long-term nature of the effects of such habitat improvements, it is difficult to determine their immediate benefits. Long-term monitoring objectives are necessary. Proposed tasks include:

1. Establish stream channel profiles to determine changes due to the project.
2. Establish long-term water quality monitoring stations.
3. Document any changes in substrate composition related to reduction in fine sediment input.
4. Monitor fish populations and establish spawner survey index sites.
5. Establish photo reference points.
6. Develop watershed database to quantify rehabilitation efforts.

Remote Site Incubators, Egg Tubes, Fry Release, Acclimation Ponds

There is much interest by the public in stocking under-utilized streams with juveniles and operating egg incubation apparatuses for seeding the stream. Public education is an additional benefit of these activities.

• Intensive evaluations are necessary for initial efforts in this category.
• If these practices prove beneficial, extensive evaluations will be conducted. Proposed tasks include:

1. Educate potential participants on the current issues surrounding uses of fish propagation techniques.

2. Quantify available habitat to accommodate returns. Achieving self-sustaining populations should be the ultimate goal for all supplementation programs.
3. Determine potential impact on wild stocks prior to releases.
4. Determine existing salmonid densities.
5. Monitor adult returns.

Landowner Involvement

It is essential that the public be informed of the importance of evaluating restoration projects.

- Extensive evaluations will be conducted in the form of surveys to indicate public interest and involvement.
- Inform public on importance of evaluation. Proposed tasks include:

1. Continue to utilize the "Fish Ladder" newsletter as information exchange.
2. Conduct public opinion surveys through CFRP cooperators.
3. Hold Chehalis Watershed Council/Chehalis Basin Fisheries Task Force public workshops.

Additional Comments

The Chehalis River Basin contains diverse habitat throughout all its sub-basins. It is difficult to extrapolate project evaluations from one sub-basin to another. Basin-wide and/or extensive strategies may be the favorable approach to evaluating CFRP as a whole. The extensive evaluation strategy still maintains an element of intensive evaluation since it investigates several projects of a particular type (e.g., off-channel rearing habitat) over a large geographic area.

The basin-wide strategy for evaluation is promising. Proposed tasks include:

1. Focus on critical stocks and finer levels of depressed stocks.
2. Utilize the Basin-wide stock inventory (Washington Department of Fisheries et al. 1993) to complement habitat restoration work.
3. Increase cooperative efforts with other programs focused on Chehalis Basin natural resources.
4. Utilize displaced timber workers for full-time evaluation work.

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